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PATENT SPECIFICATION

DRAWINGS ATTACHED

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COMPLETE SPECIFICATION

Hollow Contact Pin, particularly for Coaxial Connectors

We AMP INCORPORATED, a corporation organised and existing under the laws of the State of New Jersey, United States of America, of Eisenhower Boulevard, Harrisburg, State of Pennsylvania, United States of America do hereby declare the invention, for which we pray that a patent may be granted to us, and the method by which it is to be performed, to be particularly described in and by the following statement:—

The invention relates to a hollow contact pin stamped and formed from sheet metal and adapted to be crimped to a conductor of a cable and more particularly but not exclusively to a contact pin for incorporation in a connector for coaxial or shielded cable.

According to an aspect of the invention a hollow contact pin has an integrally formed hollow filler member disposed co-axially within one end.

The invention extends to a method of making a contact pin according to the preceding paragraph and to a connector for coaxial or shielded cables incorporating such a contact pin.

An embodiment of the invention will now be described by way of example with reference to the accompanying drawings in which;

Figure 1 is a perspective view of a connector having a contact pin according to the invention;

Figure 2 is an axial section of the connector of Figure 1 before crimping to a conductor;

Figure 3 is a view similar to Figure 2 but showing the connector crimped to the end of a shielded cable;

Figures 4, 5 and 6 are views taken along the lines IV—IV, V—V, and VI—VI respectively, of Figure 2;

Figures 7 to 10 are perspective views illustrating the progressive steps in the manufacture of the contact pin of the connector of Figure 1.

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In Figures 1 to 6 a connector 2 comprises an electrically conductive shell 4 in which a tubular contact pin 6 is coaxially fixed by means of a spacer 22 of insulating material. The pin 6 has a hollow filler member 10 disposed coaxially within one end, the pin 6 and the member 10 being joined by an integral tongue 8. The filler member 10 has an internal diameter conforming to the diameter of a centre conductor of a coaxial cable to be secured to the connector. The end 11 of the filler member 10 remote from the end of the pin 6 is bevelled to provide a lead-in to the interior of the member 10 for the conductor of the cable.

The shell 4 comprises a cylindrical hood portion 14 which progressively reduces in cross-section over a conical transition section 16 to form a crimping sleeve 18 having a bell-mouthed end 20 to facilitate insertion of a cable.

The spacer 22 is disc-shaped and is formed of a phenolic material reinforced with an inorganic insulating material, such as glass. The contact pin 6 is secured centrally of the spacer 22 by means of integral, outwardly projecting flanges 24 engaging one face of the spacer 22 and pressing the other face of the spacer 22 against a flange 12 formed by curling the end of the pin outwardly. The spacer 22 is located within the shell 4 by a shoulder 28 and is secured to the shell by means of a plurality of circumferentially spaced indentations 30 formed in the hood portion 14.

To prepare the cable to be crimped to the connector (see Figure 3) an outer insulating sheath 38 of the cable is stripped from a shielding layer 36 to expose a length which is substantially equal to the length of the connector. A part of the exposed shielding layer 36 is then removed to leave a length sufficient to extend just through the sleeve 18 of the shell 4. Finally, an inner

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insulating layer 34 of the cable is removed to expose a length of inner conductor 32 substantially equal to the length of the pin 6.

5 After this preparation the cable is inserted into the connector 2 until the inner conductor 32 extends through the filler member 10 and the shielding layer 36 extends through the sleeve 18. A portion of the pin 6 including the filler member 10 is then crimped as shown at 40 to the inner conductor 32 of the cable, and simultaneously the cylindrical sleeve 18 of the shell member 4 is crimped as shown at 42 to the shielding layer 36 of the cable.

15 Since the contact pin 6 is stamped and formed from sheet metal and has a longitudinally extending seam 44 it is advantageous to use a spiral indent type crimp as disclosed in U.S. Patent 2,816,276 in order to prevent destruction or opening of the seam 44 during the crimping operation. This spiral type crimp has the added advantage of indenting the contact pin 6 without changing its overall outside diameter.

20 A preferred method of manufacturing the contact pin 6 of the connector is illustrated in Figures 7 to 10. In these figures the several parts of the contact pin 6 are identified by the same reference numerals, differentiated by prime marks, as used in Figure 2.

25 Initially in the manufacturing process a sheet metal blank is stamped out, the blank comprising a flat rectangular portion 6' joined at one of a pair of opposite sides to one of a pair of opposite sides of a smaller flat rectangular portion 10' by a tongue 8'. The portion 10' is formed with a bevelled edge 11'. At this stage lances 24 are formed in the portion 6'. The other pairs of opposite sides of the two rectangular portions 6' and 10' are then curled in opposite directions, that is, the section 6' is curled about its longitudinal axis into the shape of an upward facing (as shown in Figure 8) part-cylindrical trough while the portion 10' is curled about its longitudinal axis into the shape of a downward facing (as shown in Figure 8) part-cylindrical trough. The blank is then bent about the tongue 8' so that the shaped portion 10' is disposed within the trough of the shaped section 6'. Finally, the two portions 6' and 10' are further curled, with the portion 10' nested within the portion 6' to form a finished contact pin 6 as shown in Figure 10.

30 A plurality of finished connectors according to the invention are advantageously provided in strip form, that is the outer shell 4 is integral with a continuous carrier strip 43 (see Figure 1), for convenient application to the ends of cables by means of an auto-

matic or semi-automatic crimping machine.

WHAT WE CLAIM IS:—

65 1. A hollow contact pin having an integrally formed hollow filler member disposed co-axially within one end.

70 2. A contact pin according to Claim 1, in which the end of the filler member remote from the end of the pin is bevelled to provide a lead in to the interior of the filler member.

75 3. A contact pin according to Claim 1 or 2, in which the pin is formed towards its other end with axially spaced, outwardly extending projections for engaging opposite sides of an electrically insulating spacer.

80 4. A contact pin according to Claim 3, in which one of the projections is constituted by an integral lance.

85 5. A connector for co-axial or shielded cables comprising a contact pin according to any one of the preceding claims secured at its other end to an electrically insulating spacer fixed within an electrically conductive shell, the pin being co-axial of the shell and extending beyond one end of the shell the other end of which is reduced in cross-section to form a sleeve to receive the shielding of the cable.

90 6. A method of making a hollow contact pin including forming a sheet metal blank comprising a first rectangular portion joined at one of a pair of opposite sides to one of a pair of opposite sides of a second, smaller, rectangular portion by an integral neck portion, curling the other pair of opposite sides of the first portion in one sense to impart to the portion a part-cylindrical shape, curling the other pair of opposite sides of the second portion in the opposite sense to impart to the portion a part-cylindrical shape, bending the blank at the tongue to dispose the shaped second portion within the shaped first portion and further curling both sections to form two co-axial cylinders.

100 7. A method according to Claim 6, including forming in the first portion of the blank an integral lance which extends away from the second portion and which is adapted to extend outwardly in the completed pin.

105 8. Contact pins as claimed in any one of Claims 1 to 4 and as described with reference to the figures 1 to 6 and 10 of the accompanying drawings.

115 9. A connector as claimed in any one of claims 1 to 4 and as described with reference to the Figures 1, 2, 3 and 6 of the accompanying drawings.

120 10. A method of forming a contact pin as claimed in claim 6 and as described with reference to the Figures 7 to 10 of the accompanying drawings.

For the Applicants:

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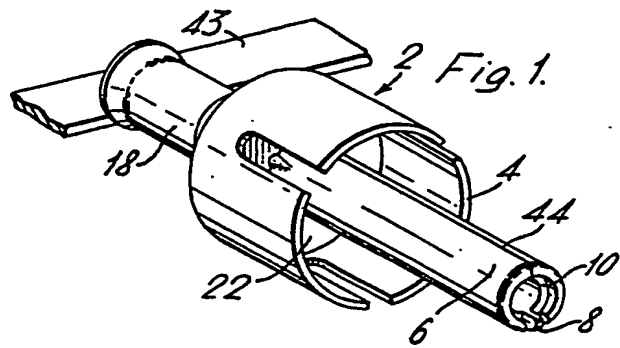


Fig. 2

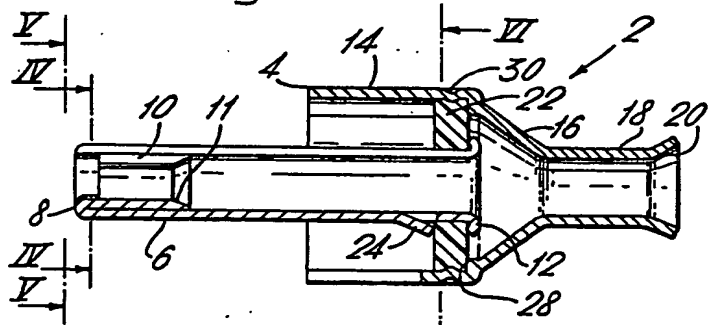
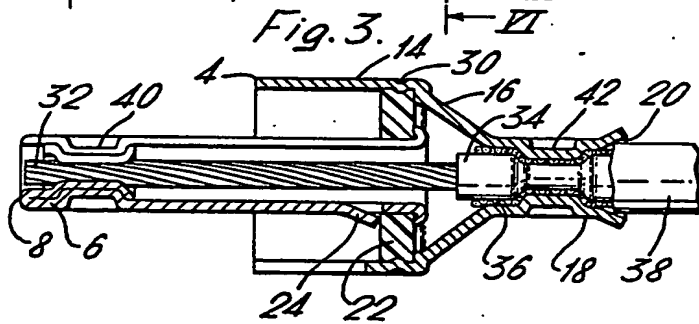


Fig. 3.



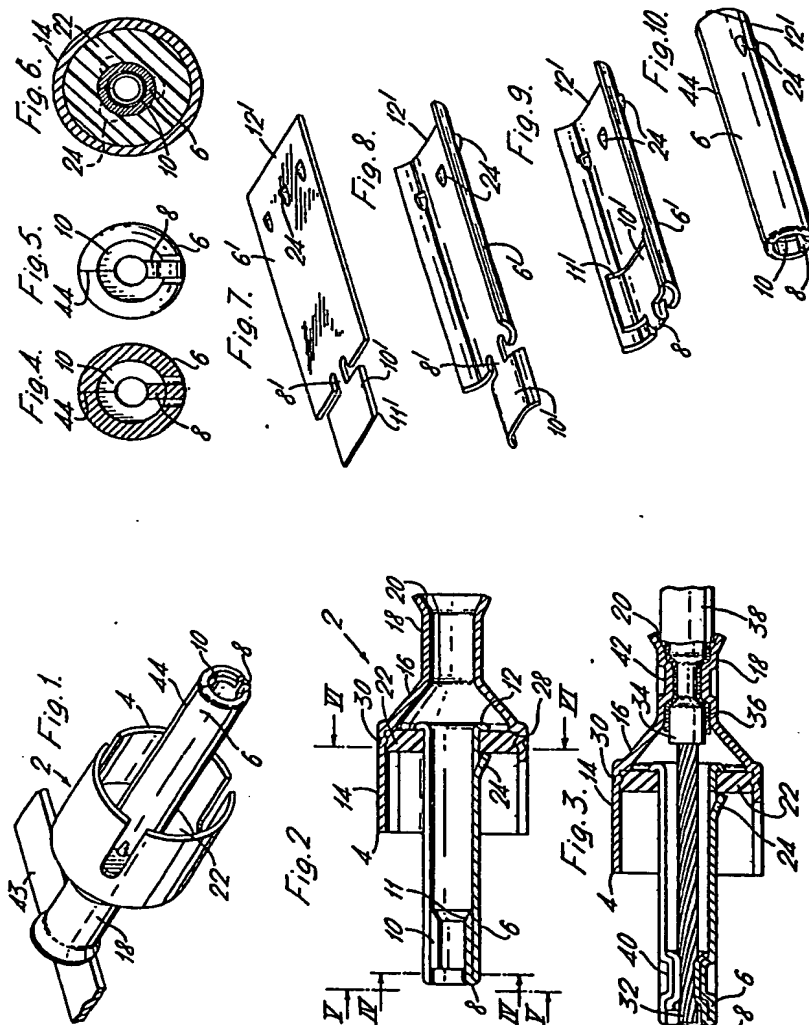
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COMPLETE SPECIFICATION

**This drawing is a reproduction of
the Original on a reduced scale
Sheets 1 & 2**



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